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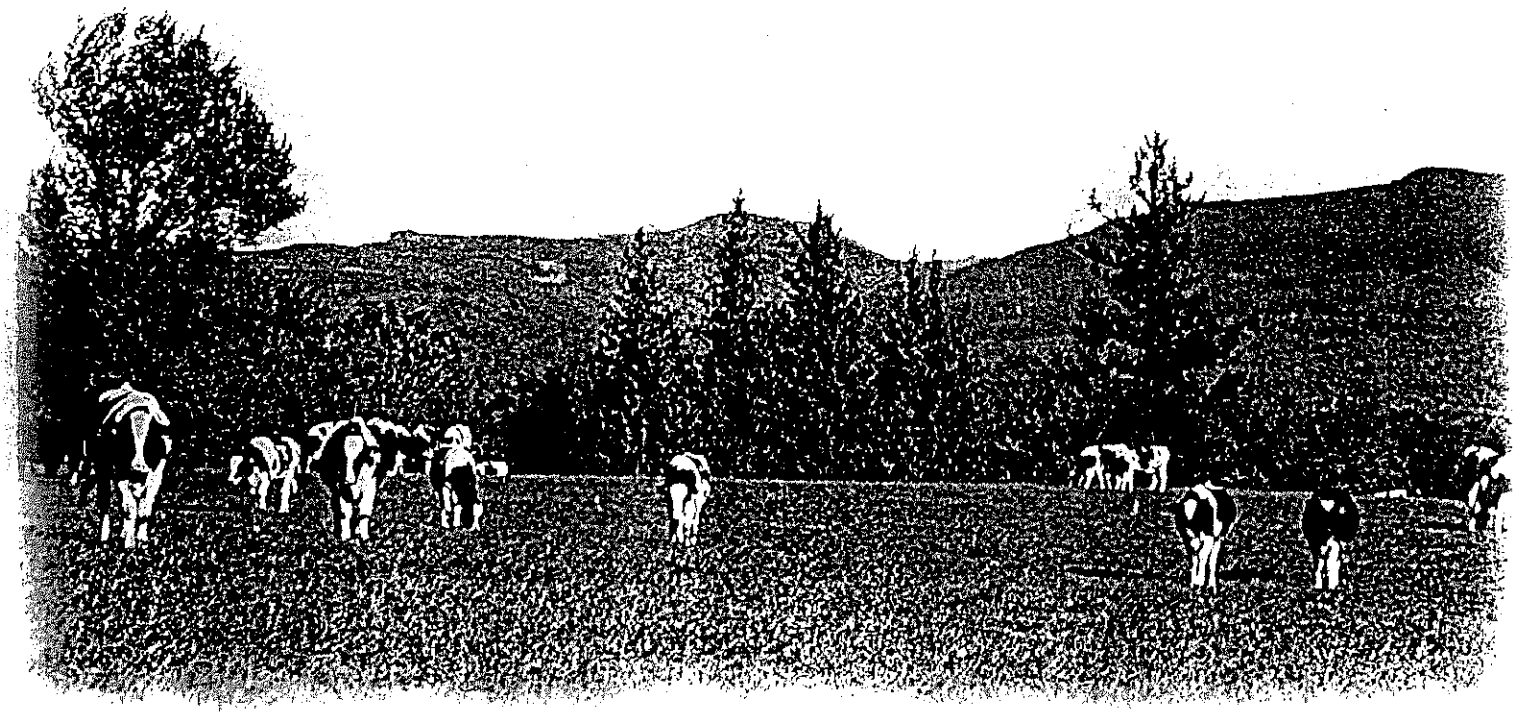
Prepared in cooperation with
Whatcom County Planning Department

Hydrogeology, Ground-Water Quality, and Sources of Nitrate in Lowland Glacial Aquifers of Whatcom County, Washington, and British Columbia, Canada

Water-Resources Investigations Report 98-4195



U.S. Department of the Interior
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Table 17. Estimates of annual amounts of nitrogen applied and deposited in the Whatcom County portion of the Lynden-Everson-Nooksack-Sumas study area, Whatcom County, Wash., and British Columbia, Canada--Continued

Nitrogen from dairy manure storage and handling applied to field--continued

(308 farms) (118 pounds N per day) (365 days) = 13,300,000 pounds N per year

70 percent of annual production of nitrogen in manures is lost to volatilization and denitrification during handling and application to field. Available nitrogen to field is 0.3 of total produced.

(13,300,000 pounds) (0.3) = 3,990,000 pounds N

Nitrogen from poultry manure storage, handling, and application to fields

$$(900{,}000 \text{ broilers})\ (50 \text{ days})\ \frac{1.1 \text{ pounds N}}{1{,}000 \text{ broiler} \bullet \text{days}} = 50{,}000 \text{ pounds N}$$

50 percent of annual production of nitrogen is lost to volatalization and denitrification during handling, storage, and application to field. Available nitrogen is 0.5 of total produced.

(50,000 pounds) (0.5) = 25,000 pounds N

Nitrogen from seepage of ammonia from dairy manure lagoon

85 percent of dairies estimated to have earthen lagoons
Average surface area of lagoon 30,000 square feet (2,790 square meters)
Seepage rate = 1 millimeter per day = 0.365 meter per year
Ammonia concentration 7 pounds per 1,000 gallons = 840 milligrams per liter
= (2,790 square meters) (0.365 meter per year) (1,000 liters per cubic meter) (840 milligrams per liter) (2.2×10^{-6} pounds per milligram) = 1,880 pounds per year-dairy)

(1,880 pounds per year-dairy) (308 dairies x 0.85) = 492,000 pounds N per year

Table 18. Estimate of annual amount of nitrogen loading to soils and nitrate entering the ground-water system in the Whatcom County portion of the study area

[--, not applicable; <, less than]

Natural processor land-use activity	Nitrogen deposited, applied, or released to soils (pounds)	Fraction of nitrogen transported to ground-water system	Nitrogen entering ground-water system as nitrate (pounds)	Percentage of total, including mineral-ization of soil organic matter	Percentage of total, excluding mineral-ization of soil organic matter
		Natural sources			
Precipitation, wet	226,000	0.50	113,000	3.2	3.9
Precipitation, dry	110,000	0.40	44,000	1.2	1.5
Legumes, (alder)	--	--	75,000	2.1	2.6
		Residential sources			
Septic tank effluent	176,000	0.68	120,000	3.4	4.2
Fertilizers, lawns, and gardens	325,000	0.25	81,200	2.3	2.8
		Agricultural sources			
Redeposition of nitrogen volatilized from manure	550,000	0.40	220,000	6.2	7.6
Irrigation	362,000	0.25	90,500	2.5	3.1
Mineralization of soil organic matter	13,600,000	0.05	680,000	19	--
Inorganic nitrogen fertilizers	2,030,000	0.25	508,000	14	18
Manure storage (lagoon leakage)	492,000	0.85	418,000	12	14
Manure applied to cropland, dairy	3,990,000	0.30	1,200,000	34	42
cropland, poultry	25,000	0.30	7,500	<1	<1
Legumes, (peas)	--	--	10,000	<1	<1
TOTAL	21,900,000		3,570,000		